Evaluation of Infringement of Tesco Patents for Pipe Handling

2006 U.S. Patent 7,140,443
2008 U.S. Patent 7,377,324

Tesco Corporation vs. Weatherford International, Inc., et al,
CA H-08-2531, U. S. District Court for the Southern District of Texas, Houston Division

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1. Introduction

Various divisions of Tesco have been in the casing running business for decades at locations all around the world. In 2003 Tesco applied for a patent on its new invention for handling pipe on a rig floor, and in 2006 was awarded Patent 7,140,443 by the U. S. Patent Office. A continuation Tesco patent U. S. 7,377,324 was issued in 2008. Following Tesco's introduction of its Casing Drive System with link tilt (CDS) and Tesco's application for patent, Weatherford International, Inc., National Oilwell Varco, L.P., Offshore Energy Services, Inc, and Frank's Casing Crew & Rental Tools, Inc. introduced casing running equipment and procedures to compete with Tesco's CDS, [1.1, 1.2].

To protect its intellectual property covered by its two U. S. Patents, Tesco filed a patent infringement lawsuit on August 19, 2008 against those parties offering competing products that Tesco believes infringe claims in its two patents. To prosecute its lawsuit Tesco retained the law firm Bracewell & Giuliani, L.L.P. of Houston, Texas. This firm contacted Wooley & Associates, Inc. of Houston, Texas to assist with certain technical issues, [1.1, 1.2, 1.3].

This report contains facts, opinions and conclusions based on my training and experience and the information reviewed at the time of this writing. My resumé is presented in Appendix 11.1. I am being compensated at a rate of $420 per hour.

These are my general opinions, but obviously not all details are included. If asked questions on these facts and opinions or other subjects, I may have opinions not specifically listed herein. There may be documents and testimony that support my opinions that are not included herein.

Discovery is ongoing. As additional information is examined, these facts, opinions and conclusions may be changed and/or supplemented. Upon review of additional documents and testimony I may supplement or revise my opinions. Also, after reading reports by defendants' experts, I may have opinions to rebut those expert opinions.

8. Infringement of Tesco Patent Claims

This section comments on the Court's claim construction, and compares the infringing products described in Sections 4, 5, 6 and 7 to cited Tesco's Patent 443 and 324 claims described in Section 3 to evaluate infringement.

8.1 Claim Construction of Court

The court construed various disputed terms in the claim language of the Tesco 443 and 324 patents. Following is a list of court construed terms, [8.1].

Claim Language	Court Construction
"axle/second axle"	None
"link arms mounted by a pivotal connection to move with the top drive"	"link arm mounted to a surface by a pivotal connection to move with the top drive, but not connected to any part of, or surface supported by, the top drive itself."
"pivotally connectable"	Add "to the pipe-engaging apparatus, but not connected to any other support surface outside the scope of the patent."
"Line arm on the pipe engaging apparatus"	"connected to the pipe engaging apparatus."
"substantially in a plane"	None
"pivotally connected/pivotally mounted/pivotal connection"	None
"lateral movement"	"side-to-side movement outside the intended plane of rotation."
"pipe engaging apparatus"	None

"bracket" (in Claim 1 of 443 patent only, not asserted)	"pipe engaging apparatus."
"fitted for anti-rotation"	"a key that fits into a guide slot extending from the top drive."
"the link arm is laterally stabilized to rotate substantially in a plane"	"washers or the equivalent structures on either side of the link arms eye ends."
"the link arm . . . substantially stabilized when in the lowered position against moving out of a plane of rotation"	"pads or equivalent structures between the link arms and the pipe engaging apparatus."
"substantially stabilizing the link arm against lateral movement"	None
"channel key"	"a mechanical projection adapted to fit into a guide slot to prevent rotation."

8.2 Literal Infringement and Doctrine of Equivalents

It is my understanding that literal infringement exists if each of the claim limitations are found in the accused product.

Also, it is my understanding that if a product does not literally infringe, it does still infringe if the product has a feature equivalent to the patent claim element. Further, it is my understanding that the tests for such an equivalent feature are the following, [8.2]:

1. Performs substantially the same function.

2. In substantially the same way.

3. To yield substantially the same result.

Another way it can be stated is the features are "insubstantially different."

This understanding may be used where literal infringement may not occur, but where there is a product feature that is equivalent to a claim element, [8.2].

8.3 CRT 350 - NOV, OES, Weatherford and Frank's

As discussed in Sections 6 and 7, the CRT 350 tool was developed in a 2005-2006 joint project between OES and NOV to compete with the patented Tesco CDS tool. Subsequently, OES, NOV, Weatherford and Frank's have all delivered the CRT 350 tool to the market place either as a product or as part of a casing running service, [6.1].

This section compares the elements of the Tesco patent claims cited in Section 3 to the features of the CRT 350 for the purpose of evaluating infringement, [1.1, 1.2].

Claim 13 of 443 Patent:

Section 3.1 of this report describes the Tesco 443 Patent Claim 13. Part 13a of Figure 3.2 introduces the first part of a pipe handling system as a pipe engaging apparatus. At the upper end of the pipe engaging apparatus is a device to connect to a top drive, and at the lower end of the pipe engaging apparatus is a pipe gripping mechanism. I understand that the CRT 350 may connect to some top drives through a crossover sub or other coupling mechanism. Even if such a coupler is used, the pipe engaging apparatus is still connected to the top drive and the coupler is simply making the connection. This same analysis applies to all of the defendants' accused products and all of the claims at issue, [1.1, 1.2, 6.1, 7.7, 8.3 - 8.6].

Features of the CRT 350 are described in Sections 4.1, 5.1, 5.2, 6 and 7, and are labeled in photographs and drawing shown in Figures 4.1, 5.1, 5.2, 6.1, 6.2, 7.1 and 7.2, and in other documents and drawings. From that discussion and the labeled figures, it is clear that the CRT 350 possesses all the elements of Part 13a shown in Figure 3.2. To the extent the pipe engaging apparatus is considered not to be connected to the top drive due to the presence of a crossover sub or other connection device, then the CRT 350 (and any of the other accused products) still infringes under the Doctrine of Equivalents because it is insubstantially different from device claimed in Claim 13, [1.1, 1.2, 6.1, 7.7, 8.3 - 8.6].

Part 13b in Figure 3.2 presents a pivotally connected link arm and 13c includes a drive system for the link arm. The discussion in Sections 4.1, 5.1, 5.2, 6 and 7, and the photos and drawings in Figures 4.1, 5.1, 5.2, 5.1, 6.2, 7.1, and 7.2, and other documents and drawings, demonstrate that the CRT 350 possesses a pivotally connected link arm with a drive system. Further the link arm must be sufficiently long to extend below the pipe gripping mechanism at the bottom end of the pipe engaging apparatus. It is obvious from the drawings, photos, discovery responses, and deposition testimony that the link arms on the CRT 350 extend below the pipe gripping mechanism at the bottom end of the pipe engaging apparatus. Therefore, in addition to Part 13a, the CRT 350 possesses all the elements of parts 13b and 13c, and therefore the CRT 350 infringes Claim 13 of Patent 443, [1.1, 1.2, 6.1, 7.7, 8.3 - 8.6].

Claim 18 of 443 Patent

Section 3.2 describes the Tesco 443 Patent Claim 18. This dependent claim adds the element that the link arm is pivotally connected to a "bracket" on the pipe engaging apparatus. The bracket includes a "channel key," [1.1, 1.2, 8.1].

As presented in Section 8.1 the Court construed "channel key" to mean "a mechanical projection adapted to fit into a guide slot to prevent rotation." On the CRT 350 there are mechanical arms that fit into the top drive guide rail to prevent rotation. It is apparent from the photographs and drawings that the CRT 350 possesses such a device to prevent rotation, and as stated above such a "projection . . to prevent rotation" would be necessary for the CRT 350 to be practical. Therefore, the CRT 350 infringes Claim 18 of the 443 Patent, [1.1, 1.2, 8.1].

Specifically the CRT 350 is equipped with a hydraulic swivel bracket with a torque backup dolly. The torque backup dolly includes projecting mechanical arms that brace against the top drive rails to prevent rotation. This anti-rotation feature infringes Claim 18 of the 443 Patent. To the extent it does not literally infringe, the CRT 350 torque backup dolly, swivel bracket and mechanical arms infringe Claim 18 of the 443 Patent by the Doctrine of Equivalents cited in Section 8.2 because they are insubstantially different and because they perform the same function as the channel key in the same was with the same result. The torque backup dolly performs the function of preventing rotation of the link arms, just like the channel key. The torque backup dolly performs this function by pressing against the immobile top drive rail to prevent rotation, and

the result, anti-rotation, is the same as with the channel key, [1.1, 1.2, 8.2].

It is my understanding that the OES, Weatherford and Frank's CRT 350 may not use the standard CRT 350 torque back up dolly, but instead may use chains or straps that extend to the top drive to prevent rotation. To the extent that the OES, Weatherford and Frank's anti-rotation chains or straps may be interpreted not to literally infringe according to the court's construction, then the OES, Weatherford and Frank's anti-rotation chains or straps infringe by the doctrine of equivalents cited in Section 8.2 because they are insubstantially different and because they perform the same function as the channel key in the same was with the same result for the same reasons described in the previous paragraph, [1.1, 1.2, 8.2].

Claim 25 of 443 Patent

Section 3.3 discusses the Tesco 443 Patent Claim 25. This dependent claim adds the element that the link arm is fitted for anti-rotation when the pipe is rotated. The discussion in Sections 4.1, 5.1, 5.2, 6 and 7, and the photos and drawings in Figures 4.1, 5.1, 5.2, 5.1, 6.2, 7.1, and 7.2, and other documents and drawings, demonstrate that the CRT 350 possesses a device for anti-rotation when the pipe rotates. Further, the CRT 350 would necessarily have to possess this feature to be practical. Therefore, the CRT 350 infringes Claim 25 of the 443 Patent, [1.1, 1.2, 6.1, 7.7, 8.3 - 8.6].

The discussion above regarding the CRT 350 anti-rotation device and its infringement of Claim 18 of the 443 Patent applies to this claim. To the extent a CRT 350 feature may not literally infringe this claim, then it infringes by the Doctrine of Equivalents cited in Section 8.2, [1.1, 1.2, 8.1].

Claim 27 of 443 Patent

Section 3.4 presents the independent method Claim 27 of the 443 Patent in five parts. Part 27a introduces components of a rig including a rotary table, top drive and pipe engaging apparatus with a pivoting link arm. The discussion in Sections 4.1, 5.1, 5.2, 6 and 7, and the photos and drawings in Figures 4.1, 5.1, 5.2, 5.1, 6.2, 7.1, and 7.2, and other documents and drawings, demonstrate that the CRT 350 is intended for use on a rig with a rotary table and a top drive. As mentioned previously, there are some rigs, e.g. completion and workover rigs, that may not have a rotary table, but the pipe (casing) can be

supported at the rig floor in a spider or other equivalent device. It has already been established that the CRT 350 is a pipe engaging apparatus with a pivoting link arm. All the elements of Part 27a exist in the CRT 350, [1.1, 1.2, 6.1, 8.3 - 8.6].

In Section 3.4 Parts 27b, 27c, 27d and 27e of the 443 Patent Claim 27 list eight components of the pipe handling method. The discussion in Sections 4.1, 5.1, 5.2, 6 and 7, and the photos and drawings in Figures 4.1, 5.1, 5.2, 5.1, 6.2, 7.1, and 7.2, and other documents and drawings, demonstrate that the CRT 350 is intended to be used with all eight of the procedures listed in Section 3.4 as Parts 27b, 27c, 27d and 27e of Claim 27. Many of the procedures are necessary for the CRT 350 to be useful. The CRT 350 has all the elements of Parts 27b, 27c, 27d and 27e of Claim 27. Therefore the CRT 350 infringes Claim 27 of the 443 Patent, [1.1, 1.2, 6.1, 7.7, 8.3 - 8.6].

The discussion above regarding the CRT 350 anti-rotation device and its infringement of Claim 18 of the 443 Patent applies to this claim. To the extent a CRT 350 feature may not literally infringe this claim, then it infringes by the Doctrine of Equivalents cited in Section 8.2, [1.1, 1.2, 8.1].

Claim 43 of 443 Patent

Section 3.5 describes the independent Claim 43 of the 443 Patent in three parts. 43a presents a pipe handling device for mounting onto a pipe engaging apparatus. Part 43b describes components of the pipe engaging apparatus including a main body and a pipe gripping mechanism, which is for rotational and axial movement of the pipe. Further the pipe engaging apparatus is connected to the top drive, [1.1, 1.2, 6.1, 7.7, 8.3 - 8.6].

Part 43c includes a bracket with a channel key. The channel key prevents rotation of the pipe handling device when the pipe is rotated. The channel key was construed by the Court as discussed in Section 8.1. Both the drawings and articles describing the CRT 350 reveal it to have a mechanical projection to prevent rotation in the form of a torque dolly as discussed above. Further the link arm is described in Part 43c as having a first (top) end pivotally connected to the pipe engaging apparatus and an outboard (bottom) end pivotally connected to a single joint pipe elevator. The link arm is sized to be able to place the pipe in a position to be gripped by the pipe engaging apparatus. The link arm with these features is with these fea-

tures is obvious in the photos and pointed out previously. The discussion in Sections 4.1, 5.1, 5.2, 6 and 7, and the photos and drawings in Figures 4.1, 5.1, 5.2, 5.1, 6.2, 7.1, and 7.2, and other documents and drawings, make it clear that the CRT 350 contains all of the elements of Claim 43, and therefore the CRT 350 infringes Claim 43 of the 443 Patent, [1.1, 1.2, 6.1, 7.7, 8.1, 8.3 - 8.6].

The discussion above regarding the CRT 350 anti-rotation device and its infringement of Claim 18 of the 443 Patent applies to this claim. To the extent a CRT 350 feature may not literally infringe this claim, then it infringes by the Doctrine of Equivalents cited in Section 8.2, [1.1, 1.2, 8.1].

Claim 55 of 443 Patent

Claim 55 of the 443 Patent is discussed in Section 3.6 in three parts. Part 55a introduces a pipe handling deice for mounting on a pipe engaging apparatus. Photos, drawings and articles describe these features in the CRT 350. In Part 55b two components of the pipe engaging apparatus are described as a main body and a pipe gripping mechanism, which is for rotating and lifting the pipe. Also, the pipe engaging apparatus is connectable to the top drive. Manuals, articles and bulletins, and photos and drawings make it clear that the CRT 350 possess the features described in Part 55b of Claim 55. Part 55c in Section 3.6 reveals two components of the pipe handling device – a link arm and a hydraulic cylinder to drive the link arm. The two ends of the link arm are connected pivotally to the pipe engaging apparatus (top) and the pipe elevators (bottom). These two components (link arm and hydraulic cylinder) exist in the CRT 350 with the features described in Part 55c. The discussion in Sections 4.1, 5.1, 5.2, 6 and 7, and the photos and drawings in Figures 4.1, 5.1, 5.2, 5.1, 6.2, 7.1, and 7.2, and other documents and drawings, show the features of the CRT 350 that possess all the elements of Claim 55, and therefore the CRT 350 infringes Claim 55 of the 443 Patent, [1.1, 1.2, 6.1, 7.7, 8.3 - 8.6].

Claim 59 of 443 Patent

Section 3.7 describes Claim 59 of the 443 Patent in three parts. Part 59a introduces a pipe handling device for mounting onto a pipe engaging apparatus. The photos and drawings, and the descriptions of use, make it clear the CRT 350 has a pipe handling device for mounting onto a pipe engaging apparatus. 59b adds the pipe engaging apparatus has two components - the

main body and the pipe gripping mechanism, which is for rotating and lifting the pipe. Also the pipe engaging apparatus is connectable to the top drive. All the elements of 59b are described and illustrated in the CRT 350 in various photos, drawings and articles. In 59c details of the link arm are provided. The two ends of the link arm are pivotally connected to the pipe engaging apparatus (top) and the pipe elevator (bottom). The link arm is sized to allow the pipe to be gripped by the pipe gripping mechanism at the lower end of the pipe engaging apparatus. Finally in 59c the link arm is fitted for anti-rotation when the pipe is rotated. As described previously, CRT 350 drawings, photos, manuals, articles and bulletins describe all of these 59c features in the CRT 350. The discussion in Sections 4.1, 5.1, 5.2, 6 and 7, and the photos and drawings in Figures 4.1, 5.1, 5.2, 5.1, 6.2, 7.1, and 7.2 describe the CRT 350 as having all the elements of Claim 59 of the 443 Patent, and therefore infringe Claim 59, [1.1, 1.2, 6.1, 8.3 - 8.6].

The discussion above regarding the CRT 350 anti-rotation device and its infringement of Claim 18 of the 443 Patent applies to this claim. To the extent a CRT 350 feature may not literally infringe this claim, then it infringes by the Doctrine of Equivalents cited in Section 8.2, [1.1, 1.2, 8.1].

Claim 1 of 324 Patent

Section 3.8 presents the elements of Claim 1 of the 324 Patent, which are separated into three parts in Figure 3.9. All of the comments in the paragraph above relating to the infringement of Claim 59 of 443 apply to Claim 1 of the 324 patent, except those comments relating to anti-rotation. Thus, all of the elements of Claim 1 of the 324 Patent exist as features of the CRT 350, and therefore the CRT 350 infringes Claim 1 of the 324 patent, [1.1, 1.2, 6.1, 7.7, 8.3 - 8.6].

Claim 4 of 324 Patent

The 324 Patent Claim 4 introduces a "bracket" on the pipe engaging apparatus, to which the link arm is pivotally connected, and a "channel key." As presented in Section 8.1 the Court construed "channel key" to mean "a mechanical projection adapted to fit into a guide slot to prevent rotation." On the CRT 350 there are mechanical arms that fit into the top drive guide rail to prevent rotation. It is apparent from the photographs and drawings that the CRT 350 possesses such a device to prevent rotation, and as stated above such a "projection . . to prevent rotation" would be necessary for the CRT 350 to be

practical. The CRT 350 has been shown to contain each of the elements of and therefore infringes Claim 4 of the 324 Patent, [1.1, 1.2, 6.1, 7.7, 8.3 - 8.6].

The discussion above regarding the CRT 350 anti-rotation device and its infringement of Claim 18 of the 443 Patent applies to this claim. To the extent a CRT 350 feature may not literally infringe this claim, then it infringes by the Doctrine of Equivalents cited in Section 8.2, [1.1, 1.2, 8.1].

Claim 12 of 324 Patent

Section 3.10 discusses the element of Claim 12 of the 324 Patent which incorporates the anti-rotation device on the pipe engaging apparatus to prevent rotation of the pipe engaging apparatus when the pipe is rotated. This dependent claim incorporates the element that is at the end of Claim 59 of the 443 Patent, which the CRT 350 has already been shown to possess. On the CRT 350 there are mechanical arms that fit into the top drive guide rail to prevent rotation. As described previously, CRT 350 drawings, photos, manuals, articles and bulletins describe this anti-rotation device. The discussion in Sections 4.1, 5.1, 5.2, 6 and 7, and the photos and drawings in Figures 4.1, 5.1, 5.2, 5.1, 6.2, 7.1, and 7.2 describe the CRT 350 as having all the elements of and therefore infringe Claim 12 of the 324 Patent, [1.1, 1.2, 6.1, 7.7, 8.3 - 8.6].

The discussion above regarding the CRT 350 anti-rotation device and its infringement of Claim 18 of the 443 Patent applies to this claim. To the extent a CRT 350 feature may not literally infringe this claim, then it infringes by the Doctrine of Equivalents cited in Section 8.2, [1.1, 1.2, 8.1].

Claim 14 of 324 Patent

Section 3.11 presents 324 Patent Claim 14 in the four parts of Figure 3.12. This claim describes a method for handling pipe in a rig with a top drive and a pipe engaging apparatus secured below. These claims elements have been addressed above and are clearly shown in Sections 4.1, 5.1, 5.2, 6 and 7, and the photos and drawings in Figures 4.1, 5.1, 5.2, 5.1, 6.2, 7.1, and 7.2, and other documents and drawings. Part 14b describes the use of the link arm to pick up pipe in Claim 14, and this feature is shown in the drawings and photos of the CRT 350 presented in this report and other documents and drawings, [1.1, 1.2, 6.1, 7.7, 8.3 - 8.6].

In Part 14c is described the method of hoisting the top drive such that the pipe is rotated to a substantially vertical position, then lowering it onto the joint below supported in the rotary table. There is much discussion of the details of these procedures in Section 3.11. Bulletins for the CRT 350 describe such procedures as shown in Sections 4.1, 5.1, 5.2, 6 and 7, and the photos and drawings in Figures 4.1, 5.1, 5.2, 5.1, 6.2, 7.1, and 7.2, and other documents and drawings. Also, these hoisting and lowering steps are necessary for the CRT 350 to be practical, [1.1, 1.2, 6.1, 7.7, 8.3 - 8.6].

Also in Section 3.11 Part 14d describes the method of slidably holding an upper portion of the pipe with the link arm and lowering the top drive until the pipe is engaged by the pipe engaging apparatus. This procedure is described in the bulletins, articles and manuals of the CRT 350, and are necessary steps for the CRT 350 to be practical as described in Sections 4.1, 5.1, 5.2, 6 and 7, and the photos and drawings in Figures 4.1, 5.1, 5.2, 5.1, 6.2, 7.1, and 7.2, and other documents and drawings. The CRT 350 is shown to have all the elements of and therefore infringes Claim 14 of the 324 Patent, [1.1, 1.2, 6.1, 7.7, 8.3 - 8.6].

Claim 17 of 324 Patent

As described in Section 3.12 Claim 17 of the 324 Patent adds to Claim 14 of the 324 Patent the steps of 1) assembling the pipe (casing) joint hanging in the pipe engaging apparatus into the joint below supported in the rotary table, 2) lifting the string to remove the slips in the rotary table, 3) lowering the string until the top casing coupling is just above the rig floor, 4) inserting slips in the rotary table (or spider) to support the string of pipe (casing) at the rig floor, and 5) releasing the pipe (casing) from the pipe engaging apparatus. The CRT 350 must conduct these procedures to accomplish the purpose for which it is intended as described in its various articles, bulletins and manuals. The CRT 350 is shown to follow these procedures in Sections 4.1, 5.1, 5.2, 6 and 7, and the photos and drawings in Figures 4.1, 5.1, 5.2, 5.1, 6.2, 7.1, and 7.2, and other documents and drawings. The CRT 350 is shown to have all the elements of and therefore infringes Claim 14 of the 324 Patent, [1.1, 1.2, 6.1, 7.7, 8.3 - 8.6].

Claim 27 of 324 Patent

Claim 27 of the 324 Patent is described in Section 3.13 and is presented in four parts in Figure 3.14. Part 27a of this claim describes a method that uses a rig floor with a V-door, a top drive and a pipe engaging apparatus to which is pivotally connected a link arm. All of these claim elements have been shown to exist in the CRT 350. Part 27b describes a method that 1) picks up a joint of pipe (casing) from the V-door, and 2) hoists the top drive until the pipe lifted by the link arm is substantially vertical. In Part 27c of Section 3.13, the method of Claim 27 continues with positioning the lower end of the pipe (casing) held by the link arms onto the top end of the joint of pipe (casing) supported by the rotary table at the rig floor. Section 3.13 continues to describe the steps of Claim 27 with Part 27d adding to the method the additional steps needed to finish the casing handling operation. With the joint of pipe held in the link arm sitting on the joint supported at the rig floor, the top drive is lowered and the link arm slides down the pipe (casing) until the upper end of the pipe joint is engaged by the pipe gripping mechanism on the lower end of the pipe engaging apparatus. The CRT 350 operates by the same method as described in the CRT 350 bulletins, articles and manuals, and shown in drawings and photographs. These procedures are shown to exist in the CRT 350 by testimony, discussion in Sections 4.1, 5.1, 5.2, 6 and 7, and the photos and drawings in Figures 4.1, 5.1, 5.2, 5.1, 6.2, 7.1, and 7.2, and other documents and drawings. The CRT 350 possesses all the elements of and therefore infringes Claim 27 of the 324 Patent, [1.1, 1.2, 6.1, 7.7, 8.3 - 8.6].

Based on the above comparison of the claim elements of Tesco Patents 443 and 324 to features of the CRT 350, and all of the comparisons in the Tesco contentions and claim charts, the following products infringe the claims cited in Section 3, [1.1, 1.2, 6.1, 7.7, 8.3 - 8.6]:

Weatherford CRT 350

Frank's Evolution 6000 (CRT-350)

OES CRT 350

NOV CRT 350

Appendix Sections 11.6 - 11.9 list the Tesco infringement contentions against Weatherford, Frank's, OES and NOV, and provide additional details in the claim charts. I have reviewed the claim charts, infringement contentions, cited exhibits, and deposition testimony. The analysis contained in the infringement contentions and claim charts is consistent with my own, and I incorporate such analysis as part of my report, [6.1, 7.7, 8.3 - 8.6].

8.4 Weatherford International

As described in Section 8.3 the Weatherford CRT 350 infringes the Tesco Patents 443 (Claims 13, 18, 25, 27, 43, 55 and 59) and 324 (Claims 1, 4, 12, 14, 17 and 27). In addition, this section evaluates other Weatherford products.

The basic components of the equipment and methods of operation are the same as for the TorkDrive 500-M, 750 HD and CRT 350. Sections 4.2 and 4.3 provide a list of features for the Weatherford TorkDrive 500 M and 750 HD, and the references in that section provide additional details from Weatherford bulletins, articles, manuals, drawings, deposition testimony and answers to interrogatories. Additionally Figures 4.2 and 4.3 provide drawings with labels of the basic components related to the Tesco patent claims. The infringement discussion of the CRT 350 in Section 8.3 applies to the Weatherford TorkDrive 500 M and 750 HD. The TorkDrive 500 M and 750 HD possess all of the elements of and therefore infringe the Tesco Patents 443 (Claims 13, 18, 25, 27, 43, 55 and 59) and 324 (Claims 1, 4, 12, 14, 17 and 27), [1.1, 1.2, 8.3].

Weatherford developed the TorkDrive Compact tool, which comes in both internal and external models. The Compact Plus is a later version of the Compact tool. Except for smaller dimensions the Compact and Compact Plus operate in the same manner with the same equipment components. The claims of the Tesco 443 and 324 patents do not contain size limitations. Section 4.4 provides a list of features for the Weatherford Compact and Compact Plus, and the references in that section provide additional details from Weatherford bulletins, articles, manuals, drawings, deposition testimony and responses to interrogatories. Additionally Figure 4.4 provides a drawing with labels of the basic components related to the Tesco patent claims. The infringement discussion of the CRT 350 in Section 8.3 applies to the Weatherford Compact and Compact Plus. The Compact and Compact Plus possess all of the elements of and therefore in-

fringe the Tesco Patents 443 (Claims 13, 18, 25, 27, 43, 55 and 59) and 324 (Claims 1, 4, 12, 14, 17 and 27), . [1.1, 1.2, 8.3].

The Weatherford TorkDrive 500 M and 750 HD, and the Compact and Compact Plus, are equipped with an anti-rotation device that infringes the cited claims of the 443 and 324 patents, which is called the "torque reaction bracket." To the extent the torque reaction brackets on these Weatherford tools do not literally infringe, they infringe by the Doctrine of Equivalents cited in Section 8.2 because they are insubstantially different and because they perform the same function as the channel key in the same was with the same result. The torque reaction bracket performs the function of preventing rotation of the link arms, just like the channel key. The torque reaction bracket performs this function by pressing against the immobile top drive rail to prevent rotation, and the result, anti-rotation, is the same as with the channel key, [1.1, 1.2, 8.2].

Appendix Section 11.6 lists the Tesco infringement contentions against Weatherford International, Inc. The analysis in this section agrees with those Tesco contentions and the accompanying claim charts. I have reviewed the claim charts, infringement contentions, cited exhibits, and deposition testimony. The analysis contained in the infringement contentions and claim charts is consistent with my own, and I incorporate such analysis as part of my report, [1.1, 1.2, 8.3].

8.5 Frank's Casing Crew and Rental Tools

As described in Section 8.3 the Frank's Evolution 6000 (CRT 350) infringes the Tesco Patents 443 (Claims 13, 18, 25, 27, 43, 55 and 59) and 324 (Claims 1, 4, 12, 14, 17 and 27). In addition, this section evaluates other Frank's products.

Frank's Evolution 4000 (FA-1)

Section 5.3 presents the features of the Frank's Evolution 4000 (FA-1) with Praying Mantis. The two link arms on the Praying Mantis converge into the attachment point for the single joint elevator. This does not change my analysis below with respect to infringement of the asserted claims for the FA-1 and Super TAWG. To the extent the two joined link arms are determined to not literally infringe, they infringe under the Doctrine of Equivalents because they are insubstantially different

from the claims and perform the same function (attaching to the elevator) in the same way (pivotal connection) and achieve the same result, [5.1, 5.6 - 5.8].

The Evolution 4000 (FA-1) has an internal casing gripping mechanism on the lower end of the pipe engaging apparatus. Similar to Weatherford's introduction of its TorkDrive 500 M, Frank's Evolution 4000 (FA-1) was introduced for Frank's to offer a tool like the CRT 350 but with greater capacity. The Evolution 4000 (FA-1) has a 500 ton capacity compared to the 350 ton capacity of the Evolution 6000 (CRT 350). Although there are some differences between the Evolution 6000 (CRT 350) and the Evolution 4000 (FA-1) required to provide the increased power, the basic components of the equipment and methods of operation of the Evolution 4000 (FA-1) are the same as the Evolution 6000 (CRT 350), [5.1, 5.6 - 5.8].

Section 5.3 provides a list of features for the Frank's Evolution 4000 (FA-1), and the references in that section provide additional details from Frank's bulletins, articles, manuals and drawings. Additionally Figures 5.3 provides a drawing with labels of the basic components related to the Tesco patent claims. The infringement discussion of the CRT 350 in Section 8.3 applies to the Frank's Evolution 4000 (FA-1). The Evolution 4000 (FA-1) possesses all of the elements of and therefore infringes the Tesco Patents 443 (Claims 13, 18, 25, 27, 43, 55 and 59) and 324 (Claims 1, 4, 12, 14, 17 and 27), [1.1, 1.2, 8.4].

The Frank's Evolution 4000 (FA-1) casing running tools are equipped with an anti-rotation device called a "torque reaction kit" that infringes the cited claims of the 443 and 324 patents. To the extent this assembly on these Frank's tools does not literally infringe, they infringe by the Doctrine of Equivalents cited in Section 8.2 because they are insubstantially different and because they perform the same function as the channel key in the same was with the same result. The torque reaction kit performs the function of preventing rotation of the link arms, just like the channel key. The torque reaction kit performs this function by pressing against the immobile top drive rail to prevent rotation, and the result, anti-rotation, is the same as with the channel key, [1.1, 1.2, 8.2].

Frank's Super TAWG

As described in Section 5.4 the Frank's Super TAWG tool is similar to the Evolution 6000 (CRT 350) in basic components and

operating procedures. The Super TAWG includes a torque activated internal pipe gripping mechanism that is smaller with less capacity than the Evolution 6000 (CRT 350), 125 - 250 tons compared to 350 tons for the Evolution 6000 (CRT 350)., [1.1, 1.2, 8.3].

Although there are some differences between the Evolution 6000 (CRT 350) and the Super TAWG tool required to provide the smaller size with reduced power, the basic components of the equipment and methods of operation of the Frank's Super TAWG tool are the same as the Evolution 6000 (CRT 350), [5.1, 5.6 - 5.8].

Section 5.4 provides a list of features for the Frank's Super TAWG tool, and the references in that section provide additional details from Frank's bulletins, articles, manuals and drawings. Additionally Figures 5.4 provides a drawing with labels of the basic components related to the Tesco patent claims. The infringement discussion of the CRT 350 in Section 8.3 applies to the Frank's Super TAWG tool. The Frank's Super TAWG tool possesses all of the elements of and therefore infringe the Tesco Patents 443 (Claims 13, 18, 25, 27, 43, 55 and 59) and 324 (Claims 1, 4, 12, 14, 17 and 27), [1.1, 1.2, 8.4].

The Frank's Super TAWG casing running tools are equipped with the same anti-rotation device as the FA-1. My analysis of the FA-1 torque reaction kit given above applies to the Super TAWG tool, [1.1, 1.2, 8.2].

Appendix Section 11.7 lists the Tesco infringement contentions against Frank's Casing Crew and Rental Tools, Inc. The analysis in this section agrees with those Tesco contentions and the claim charts accompanying those contentions. I have reviewed the claim charts, infringement contentions, cited exhibits, and deposition testimony. The analysis contained in the infringement contentions and claim charts is consistent with my own, and I incorporate such analysis as part of my report, [8.4].

8.6 Offshore Energy Services

As described in Section 8.3 the OES CRT 350 infringes the Tesco Patents 443 (Claims 13, 18, 25, 27, 43, 55 and 59) and 324 (Claims 1, 4, 12, 14, 17 and 27). At this time the OES CRT 350 is the only OES tool known to infringe the Tesco patent claims, [1.1, 1.2].

Appendix Section 11.8 lists the Tesco infringement contentions against Offshore Energy Services, Inc. The analysis in Section 8.3 agrees with those Tesco contentions and the accompanying claim charts. I have reviewed the claim charts, infringement contentions, cited exhibits, and deposition testimony. The analysis contained in the infringement contentions and claim charts is consistent with my own, and I incorporate such analysis as part of my report, [8.5].

8.7 National Oilwell Varco

As described in Section 8.3 the NOV CRT 350 infringes the Tesco Patents 443 (Claims 13, 18, 25, 27, 43, 55 and 59) and 324 (Claims 1, 4, 12, 14, 17 and 27). At this time the NOV CRT 350 is the only NOV tool known to infringe the Tesco patent claims, [1.1, 1.2].

Appendix Section 11.9 lists the Tesco infringement contentions against National Oilwell Varco, L.P. The analysis in Section 8.3 agrees with those Tesco contentions and the accompanying claim charts. I have reviewed the claim charts, infringement contentions, cited exhibits, and deposition testimony. The analysis contained in the infringement contentions and claim charts is consistent with my own, and I incorporate such analysis as part of my report, [8.6].